

## AN OBITUARY NOTICE OF MR. JOSEPH HARRISON, JR.

BY COLEMAN SELLERS.

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When we review the life of any prominent individual and attempt to analyze the motives that seem to have actuated him, and which may have led to his success, we can scarcely avoid noting a resemblance to other lives; we find the same results following the same general course of action in all. This orderly sequence of events leads us to think we are subject to some fixed law, with which law seemingly accidental causes may interfere to give endless variety in detail, yet not materially to alter the result. That the good and obedient son, the industrious apprentice, the faithful workman, should in time grow to be the much-respected and influential citizen, seems so natural and orderly that life in such a case appears as if "it was a sum duly cast up giving results in particular figures."

In rendering tribute to the memory of our late associate, Joseph Harrison, Jr., by reviewing the prominent events of his life and recording the results accomplished by him, the high position held by him in his latter days demands a careful consideration of the orderly growth of a life which had its beginning in the enforced economy and habits of industry of the apprentice and in a few years of home training.

So far as any chronological record of his life is needful, the task you have honored me by imposing on me is rendered easy by his own forethought in presenting to his children a well-written autobiography so clear and precise in its narrative that it is difficult to avoid the use of his own words in giving here the outline of his life. Previous to the War of Independence Mr. Harrison's ancestors seem to have been well-to-do; but his grandfather, who was a large land-holder in New Jersey, entered the army, and afterwards neglecting his personal affairs, died in 1787, leaving but little for his family. His son, Joseph Harrison, was sent to Philadelphia when fourteen years old, and was employed by Mr. Charles French, grocer, whose daughter he married in 1803. He seems to have been unfortunate in business, and the subject of this memoir was born, as he says, in the dark hours of his family history. This was on September 20th, 1810, so that Joseph Harrison, Jr., was 63½ years of age at the time of his death, March 27th, 1874.

In his youth he seems to have been fond of reading the few books at his command, and very early he evinced a strong inclination towards mechanical pursuits. Following this bent after what schooling he could obtain before he was fifteen years old, he was at that age indentured to Frederick D. Sanno, in the old district of Kensington, to learn the art and mystery of steam engineering. In about two years the failure of Mr. Sanno canceled his indentures. He considered the change that this necessitated a good thing for himself, as he was then enabled with some

experience to enter a better shop upon more advantageous terms. His second employer was "an uneducated Englishman, but a very good workman," and in his shop he soon became more proficient, and at the age of twenty, before he was yet free, he was made foreman of part of the establishment and had under him thirty men and boys. At the expiration of his apprenticeship to James Flint, he continued with the firm, then Hyde & Flint, for one year, and left them to take employment with Philip Garrett, a Quaker gentleman, who had a small shop for the manufacture of "small lathes, presses for bank-note engravers and the like." He remained with Mr. Garrett until 1833, then went to Port Clinton, Pennsylvania, to start a foundry for Mr. Arundus Tiers, with whom his father was engaged as accountant. This was the end of the varied experience as a mechanician preceding his career as a constructor of locomotives. In 1834 he was employed by William Norris, then engaged with Colonel Long in building locomotives (the design of the latter-named gentleman). Here he obtained his first insight into that branch of the mechanic arts that was afterwards to be his life-work. He seems to have considered this part of his mechanical education as of a negative character, as he said "he had been schooled in the midst of failures," so that when in 1835 he was engaged by Messrs. Garrett & Eastwick as foreman, and was intrusted with the designing of the locomotive "Samuel D. Ingham," he endeavored to avoid what he believed to be "the errors with which he had been made familiar." This engine was considered a success, and led to the construction of others like it. On December 15, 1836, he married Miss Sarah Poulterer, whom he had met in New York in January, 1835. After his marriage, in 1837, he became a partner in the firm of Garrett, Eastwick & Co., investing his skill, the only capital he had, in the venture. In 1839, when Mr. Garrett retired from business, the firm took the title of Eastwick & Harrison. In 1840, he designed an engine at the request of Mr. Moncure Robinson, of the Reading Railroad. This engine, named the "Gowan & Marx," "proved to be, for its weight (eleven tons), the most efficient locomotive for freight purposes that had been built anywhere." This event seems to have been the turning point in his life, for two Russian Engineers, Colonels Melnekoff and Kraft, were in America at that time studying the railway system of this country. They saw this engine and were so well pleased with its operation that they procured tracings from the drawings of it, and took them to Russia. This style of engine seems to have been adopted by the authorities in Russia, and Mr. Harrison was invited to visit that country, money being forwarded to defray his expenses. He was cordially received, and in 1843, in association with his partner, Mr. Eastwick, and Mr. Thomas Winans, of Baltimore, he concluded a contract with the Russian Government to build the locomotives and rolling stock for the St. Petersburg and Moscow Railway. This contract amounted to three million dollars; the work to be done in five years, it being conditioned that all the work should be done in St. Petersburg, by

Russian workmen or such as could be hired on the spot. It was at this critical period of his life that he experienced the advantages of his early training. The great work was to be carried on in a land where every kind of corruption was the rule; where all the subordinate officials of the land fed and fattened on the commissions collected from those who had contracts with the Government. The payments were to be made as the amount of work completed; inspectors were to examine into the work done, and report as to the correctness of the monthly statements. The inspectors, for a pecuniary consideration, were ready to endorse any statement, no matter how false, yet would threaten annoyance if they were not bribed. This, added to the trouble of working inexperienced hands, made the task of the contractors the more difficult. Mr. Harrison had been told by Count Bobrinski that the officials would wear them out long before the term of their contract was ended. The Count, meeting him in after years, spoke of the conversation and said the success of the American contractors had been a mystery to every one. They did not understand how that contract and subsequent ones could have been carried out without resorting to the usual practice of doing Government work in that country. In their efforts to act fairly and honestly in their work they seem to have been upheld by all the higher officers, and their course won the confidence and approval of the Emperor himself, who was a careful observer of the work as it progressed. In all of Mr. Harrison's successes under these many difficulties his character as a cautious, prudent and strictly upright man was manifest, and was clearly the outgrowth of his early training. The confidence inspired led to other contracts, as in 1850 to one to maintain the moveable machinery of the road already equipped by them for the term of twelve years. This contract bears date August 25, 1850, and the parties to it were Messrs. Joseph Harrison, Jr., Thomas Winans and Wm. L. Winans, the latter having purchased Mr. Eastwick's interest in the contract of 1843, previous to its completion. As an evidence of the Imperial favor, valuable diamond rings had been given to the members of the firm, and Mr. Harrison was made the recipient of the ribbon of the Order of St. Ann, to which was attached a massive gold medal, upon which was inscribed in the Russian language the words "For zeal." This honor was conferred upon him at the time of the completion of the bridge across the Neva, accomplished by the firm during the time of the first contract, which had been extended one year for this purpose. During Mr. Harrison's residence abroad he seems to have noticed with interest the effect of the art galleries on the working people, and when he returned home he at all times advocated the foundation of public art museums open to the people at all times, and was active in the establishment of one in our Park. He frequently expressed his opinion of the need of art culture in improving the taste of artisans and rearing among us competent designers. An appreciation of the beautiful prompted him to collect about him many paintings and other works of art, which served to beautify the home he soon built for himself in his native city.

It was in 1852 that he returned from abroad and located himself in Philadelphia to enjoy the rest from active business cares needful after his many years of labor. The ample means that had rewarded his enterprise abroad enabled him to gratify his taste for art and later to do good service to the world in his crowning achievement yet to be alluded to—his safety steam-boiler.

Soon after his return to America he built the house which was his home for the remainder of life. The planning and arranging of many of the seemingly minor details of this building gave him pleasing employment for some years. It was at this time that the writer became acquainted with him, was made aware of his mode of thought and his ability as a mechanic. He can bear testimony to the fact, of interest it may be to mechanics only, that hidden under the plaster of that house are very many ingenious devices to insure stability and to economize space by the use of iron in forms and shapes not commonly known to architects at that time. These were special adaptations suggested by a mind fertile in resources, familiar with the use of iron and possessed of a knowledge of how to form it and use it to good advantage.

He chose to invest much of his means in real estate, and numerous fine buildings which serve to beautify the city were erected by him. At one time he advocated the concentration of all the railroad termini at one central point in the city, and to combine with the depot commodious hotel accommodation. With this end in view he attempted to purchase land, not so much as a speculative movement as to render such a plan possible. It is believed that he felt disappointed when this scheme was shown to be impracticable. In this connection it may be well to mention that in 1860 he desired to return to Europe with his family, and upon the eve of his departure he sent a message to the writer requesting him to call to see him. He then said that he desired to tell one who understood him why it was that he was about to leave so pleasant a home. He spoke of the many plans he had had in view to benefit the city, and said with sorrow that he felt that his motives had been misconstrued, and in some respects his efforts had been failures on this account. He desired to go abroad, to be absent for some years; that while away his plans should be forgotten and when he returned he could begin again in some other direction. Previous to this, in 1858, he mentioned to his friends an invention he had made to obviate the danger of disastrous explosions in steam-boilers. Starting with the idea that the strength of any structure is the strength of its weakest point, he aimed to construct a steam-boiler built up of units of some given strength. He claimed that a sphere of metal, say of cast iron, might be formed with its walls not more than three-eighths of an inch in thickness and of such a diameter as would establish its bursting pressure at may be 1000 pounds per square inch. Such a sphere would doubtless be safe for the pressures usually required by users of high-pressure steam. He proposed casting these spheres in groups of two and four, uniting them in one plane by curved necks and making openings at



right-angles to these uniting necks in the form of half necks with rebate joints to match with similar joints on the other groups. A group of four balls might be called a unit, and a pair of balls a half unit, corresponding with whole bricks and half bricks in building usage. Each of these units would possess a strength measured by the strength of each individual ball or sphere forming part of the unit, and a boiler structure built up in any form and to any extent would have a strength identical with the strength of each unit used in its construction. As the various groups of balls were to be held together by bolts passing through the opening from end to end of the pile, it was presumed that these bolts would stretch under an unusual strain and thus permit a leak at the joint, so, making, as it were, a great many safety-valves to relieve the strain. It was of primary importance that the walls forming all the sides of these groups of balls should be of uniform thickness. To accomplish this result a knowledge of the founding art would be needed. When Mr. Harrison presented this idea to the public he had evidently carefully considered all the difficulties that would occur in the practical realization of it and in its introduction. He had already perfected his plans and was prepared to direct the preparation of the patterns from which these groups of spheres could be cast of uniform thickness of metal, on what is technically known as a green-sand core, so that the first group or unit cast was perfect in all respects. He had also matured a plan of dressing the rebate-joints in the groups by machinery, thus insuring accuracy of size and making the parts interchangeable, without depending on the skill of the workman.

The first boiler built on this plan was tried in the establishment of Messrs. William Sellers & Co., in this city. It was erected in the spring of 1859, and for many months supplied all the steam needed in that establishment. To avoid all risk from so novel an experiment the cast iron boiler was worked for several months at Mr. Harrison's own expense, fires being kept under the wrought iron boilers in readiness for use should the new one give out. It may be well to mention that from that time to the present writing, these boilers have been in constant use in the same place under some of the many forms afterwards designed. The invention of this kind of safety boiler marked a distinct era in boiler construction ; and whatever may be the ultimate history of this invention, whether its use be continued in future, or it be superseded by other forms, it is nevertheless a well-established fact that its inception precluded all the forms of sectional safety boilers now in use which are presented, each with some special claim for efficiency, durability and safety. Mr. Harrison did not claim for his invention diminished first cost, nor did he anticipate any greater efficiency than was obtainable by any first-class boiler, but he was sure of a greater safety in the use of high-pressure steam and he thought that the use of his invention might render possible the safe employment of higher pressures, if desirable, than was before considered possible with any of the ordinary types of wrought iron boilers.

Had Mr. Harrison presented to the world no other work but this his life would have been justly classed among the benefactors of our race. As it was, this invention was a crowning achievement of a life full of usefulness.

Much of the detail of the machinery needed to produce these steam-generators was perfected during the years he was abroad, between 1860 and 1863, he returning to America in the summer of the latter year. After his return he erected a factory for the production of his boiler, and in the arrangement of this establishment he evinced mechanical ingenuity of the highest order. He introduced many novelties in the methods of founding ; in modes of cleaning the castings and in the general system of proving the work when done. He aimed to so systematise the work as to dispense with skilled labor as far as possible, using machinery in its place.

As Mr. Harrison had passed through the various conditions of life as an apprentice, as journeyman, as foreman, and then as principal in his career as a mechanic, and had achieved proficiency as a skilled workman before the days of modern machine-tool and labor-saving appliances, he naturally believed such training to be the proper one for the youths of our day, and in a measure deprecated the practice of keeping young men too long at school if they looked toward success in the workshop. As this was emphatically announced in public near the end of his useful life, it may be well to give it more than mere mention. In the journey of life there are in the memory of all persons events which stand as landmarks on the road ; certain points that appear prominently in view and are remembered at all times in their proper order. In looking backward along this road traveled but once, these important events are clearly seen, no matter how long the road may have been, and the more distant ones seem crowded in close proximity, the space between them having been lost to view, so that the sum of life seems made up of the strongly marked events only. If these events lead step by step towards affluence and position, they must seem to the traveler on that road to have surely marked it as the only path that could have led to such results. Mr. Harrison saw in his early application to the workbench, in his early industry grown to habit, in his enforced economy in boyhood, the foundation of own his success. He prided himself on his skill as a workman, and although he ceased to work with his hands when he took control of his greater enterprises, yet he felt that in learning how to work he had stored his mind with the knowledge of most use to him as a master-mechanic. Hence we are not surprised to hear him advise the need of early apprenticeship to those who desire to become mechanics. His expression, "In mechanical and other trades it is the education of the work shop and not the education of schools, that is most required," was prompted by the bias of his own career, and was strengthened by observation of the course of many others who, like him have, from rough beginnings, achieved distinction. His life, like the lives of those many others, was a long period of

study. He pursued such knowledge as he needed, because he did need it, and for its use to him he loved it. The varied incidents of his life abroad, the persons with whom he came in contact, aided his mental culture. His manual skill secured his advancement in the workshop. The knowledge he needed was obtainable from daily observations only ; it was not written in any book ; mere skill as a workman would not give him this knowledge, but it did give him opportunities of observation, and he was ready to avail himself of the fund of information so collected. His opinion in the matter of the education of mechanics has weight and needs careful consideration. He had but to point to his own career as an example to prove the rule he laid down. There are comparatively few of the youths of the present day who care to go through the years of apprentice life. The tendency of all modern schooling is to make tradesmen of them, not mechanics. Of these few who from strong inclinations would lead a mechanic's life but a still smaller proportion can find places in the work-shops of the land. Hence the need of schools that may take the place of these work-shops and give to our young men the very knowledge that Mr. Harrison claimed they most needed. He did not believe that mere manual skill would insure success ; he knew that much learning was needed, but he believed that knowledge was within the reach of every one who would diligently seek it. He says of himself that while quick to learn at school and was in some branches at the head of his class, yet strange to say he never wrote a composition at school, and did not write his first letter until after he was twenty years of age.

So far as technical education was needed by him in his career as a locomotive-builder, it must be borne in mind that it was in that direction unobtainable when he most needed it. No books were yet written to guide him ; the locomotive-engine was a new thing, railroads were yet young. His mind grew with the progress of the art, and he did his full share in that progress. Had he continued to the end of his life at the same work he would have still grown with his work, and would doubtless have still been a master-mind in that direction. But it must be remembered that the work he did and that others have done in advancing the mechanic arts, makes now more learning needed on the part of one who would take up engineering as a science at the place where he and they left off.

Towards the close of his life, Mr. Harrison turned his attention towards recording some of his thoughts and experiences. After writing some verses, entitled "The Iron Worker and King Solomon," intended for the amusement and instruction of his children, and designed to impress their minds with the "value of what is but too frequently thought to be very humble labor," he published a folio volume of over two hundred pages, containing this poem and some fugitive pieces accompanied by his autobiography, and many interesting incidents of life in Russia, also all the leading particulars of the invention of his boiler. He wrote a paper on the part taken by Philadelphians in the invention of the locomotive, an account of the completion and opening of the bridge over the Neva in

Russia, and a paper on steam boilers. In all these he showed considerable literary ability and fully sustained his claims to the possibility of self-education.

The dignity of labor was a favorite theme with him, and he held in high esteem the producers in the world's economy. He said that when he returned to America he found that undue prominence was given in society to mercantile pursuits and an underrating of mechanical occupations. During the year 1859, he gave a dinner party to fifty gentlemen, who were invited ostensibly to hear a lecture by Dr. Hays on the Open Polar Sea, but planned in reality to bring together certain persons in different positions in life who were representatives of different classes, and who were not well-known to each other. This object was fully explained by him to the writer, and was much dwelt upon in his mind at that time. He said that banking facilities were extended to merchants what were not accorded to mechanics; that in his early career he had felt this want of confidence very keenly, and he earnestly desired to help place the producer in his proper place in the opinion of the world as to usefulness. He lived to see a great change in this respect due somewhat to his own exertions, but may be more to the enforced need of exactness of mercantile pursuits in the conduct of the business of the manufacturer.

His interest in the fine arts was continued up to the close of his life, and it was known that he desired to give to his valuable collection some permanency, but pain and suffering came upon him too soon and thus suddenly checked much of his exertions. Only those who were near to him knew how much he suffered during the last few years of his life, and with what patience he bore a malady which he was conscious might at any time end his life in pain and suffering, and of which he yet hoped he might be cured. It is probable that his malady seriously affected him as early as 1869, for a letter dated August 12th of that year, addressed to him at Saratoga by his physician, says in speaking of the cause of his decease: "I have seen many cases of it in my life and they have all finally thrown the disorder off." This, however, was not to be in his case, and the best medical skill of the land only gave him partial relief, and five years of great suffering were only ended by the hand of death.

These years of illness did not prevent him from taking a great interest in all that was going on in the world of art and science, and he busied himself much in writing. He had lived to see his children grown up and settled. He leaves behind him a widow and six children—William, Henry and Annie, who was born in this country before he went to Russia; Alice M'Neil, Marie Olga and Theodore Leland, born in Russia, and Clara Elizabeth, born in America after their return. In his home life he was an affectionate husband, a kind and indulgent father, and at all times a dutiful son. The words written by himself to his family are full of love and kindness. His book for their use and comfort was dedicated:



" TO THEE  
 WHO HAST BEEN  
 FOR MORE THAN HALF MY LIFE  
 MY TRUEST FRIEND,  
 MY COUNSELOR,  
 MY WIFE."

During the latter part of his life he was connected with the Protestant Episcopal Church,\* and had been a regular attendant at Divine service at all times. He made no outward show of religious bias, but ever bore himself as an honest, upright citizen striving to do what was right. His worth and ability led to his being asked to fill many positions of honor and trust, and he received many substantial evidences of appreciation of his work. For what he had done in the direction of safety in steam-boiler construction he was, on May 30, 1871, made the recipient of the great gold and silver Rumford medals by the American Academy of Arts and Science "for the mode of constructing steam boilers invented and perfected by" (Mr. Harrison), which "secures great safety in the use of high-pressure steam, and is, therefore, an important improvement in the application of heat."

Mr. Harrison was elected a member of this Association July 15, 1864; signed the Constitution and was introduced to the presiding officer, Judge Sharswood, Vice-President, December 2d, 1864, having accepted his membership by letter dated September 26, 1864. He was also a member of other learned societies, but with the exception of few papers read by him he did not take a very active part in the business of any of them. Of him it cannot be said that fortune was more kind than to others. His success was the legitimate outgrowth of his beginning. There may be some who "when they have planted their feet on the first rung of a ladder must needs mount;" with some the ladder of life is an unbroken one and to fall in climbing can be but from sheer carelessness. But his life was not without many trials. There were many missing rungs in that ladder, and these gaps, sometimes very wide, had to be crossed with prudent care. To him was intrusted the keeping of many talents, and he proved himself a good and faithful steward.

\* Mr. Harrison was confirmed by Rt. Rev. Wm. Bacon Stevens, at the Church of the Holy Trinity (Nineteenth and Walnut streets), Sunday, May 2d, 1869. Rev. Phillips Brooks, Rector.